Saskatchewan Ministry of Agriculture

CROP PRODUCTION NEWS

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CROP PRODUCTION

PRODUCTION

Editor's Comments

Ray McVicar, Crops Branch

In the past two weeks, weather across the grain belt has been characterized by cool and hot temperatures, thunderstorms and sunshine. Some plant diseases have remained active due to high humidity and rain showers. While the wheat midge control season has passed, it is important to continue to check the crops for potential threats.

The Bertha armyworm risk map has changed over the past few weeks, with more potential hot-spots showing up. Check the updated map online at: www.agriculture.gov.sk.ca/Production (Click on Crops – Insects and scroll down to Bertha Armyworm Map).

Harvest has begun in the southwestern region of the province. For more information on the progress of the 2009 crop, consult the Saskatchewan Ministry of Agriculture's *Weekly Crop Report* at: www.agriculture.gov.sk.ca/Crop-Report

If you are applying a crop protection product this time of year, please REMEMBER TO FOLLOW THE PRE-HARVEST INTERVAL (PHI) GUIDELINES. The PHI is the number of days that must pass between the last application of a pesticide and harvest. Harvest is defined as the cutting of the crop or the removal of the product from the plant. This includes direct combining, cutting (swathing) or grazing; it does not include swath-combining or baling for hay.

Refer to the crop protection product label or the product information in the *2009 Guide to Crop Protection* (www.agriculture.gov.sk.ca/Guide_to_Crop_Protection) for more information on a specific product's PHI.

Pre-harvest glyphosate should not be applied to crops destined for planting seed, as the germination and vigour levels can be negatively affected.

NOTE: Throughout this document, you will see that some publications are in blue font and underlined, indicating links to website information. If you are reading this off your computer screen, press the CTRL button and click your cursor on the link to take you directly to the website. ✡

Crop Production News is a biweekly publication prepared primarily by provincial specialists with the Crops Branch of the Saskatchewan Ministry of Agriculture. It is a compilation of articles related to entomology, plant pathology, weed science, soils and agronomy issues.

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Crop Protection Lab Update

By Philip Northover, Supervisor, Crop Protection Laboratory

As we move into August, samples continue to flow in steadily to the Crop Protection Laboratory. In the past two weeks, a number of disease samples have been submitted: the majority have been wheat/durum, a significant amount of lentil, pea, barley, flax and canola and the balance of the samples consisted of oats, poplar, chickpea, spruce and pepper. Fifty-seven Dutch elm disease samples were submitted, bringing the total for the year to 178, of which 85 were positive.

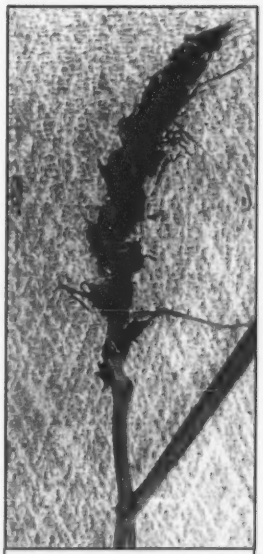

Figure 1: Loose smut of barley.
Source: Saskatchewan Agriculture

One of the more interesting disease submissions in the past two weeks was loose smut of barley, caused by the fungus *Ustilago nuda*. This disease is quite common although losses are usually low, thanks to improved cultivars and seed treatment use. The brown colour on the head is caused by masses of fungal spores which have replaced the seeds. Spores are dispersed into the air by the wind, and when they land on healthy barley flowers, can germinate under humid conditions at temperatures of 16° to 22°C and penetrate the embryo. The fungus survives in the seed and, after germination, re-grows following the growing point of the crop. Instead of barley seeds, masses of spores are produced, and dispersed into the air once again.

The use of resistant cultivars, systemic seed treatments and smut-free seed are the best approaches to manage this disease. ☼

Causes of Damage and Death of Spruce Trees in Saskatchewan Shelterbelts

By Glen Sweetman, Provincial Specialist, Greenhouse and Nursery Crops

Spruce tree shelterbelts experienced a lot of damage this year. Random damage is often the result of pests such as insects or disease, while a regular pattern of damage usually suggests environmental factors. This year, the environmental factors that caused the most damage were drought stress, extreme wind and last winter's extremely cold temperatures. This damage will be compounded in areas that experienced drought again this summer. Spruce trees often produce cones following a stressful year.

Winter browning or desiccation, which are symptoms of environmental damage, occur when the needles lose more water than they can replace. South- and west-facing branches are the primary sites of this type of injury. The needles turn yellow, brown or red-brown.

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Causes of Damage and Death of Spruce Trees in Shelterbelts
(Continued from page 2)

Damage will vary from a slight decrease in the efficiency of the affected needle to total loss of the branch or even the death of the tree. Environmental damage may not be fatal, even with severe needle loss, as long as the buds are not damaged. Reducing moisture stress during the growing season will reduce the risk of winter injury. Watering in the spring, when the ground thaws, will help the new growth get off to a healthy start.

Other non-environmental factors can cause comparable symptoms. Check for browning caused by iron deficiency, herbicide damage, flooding and damage to the roots from heavy traffic or excavation in the root zone.

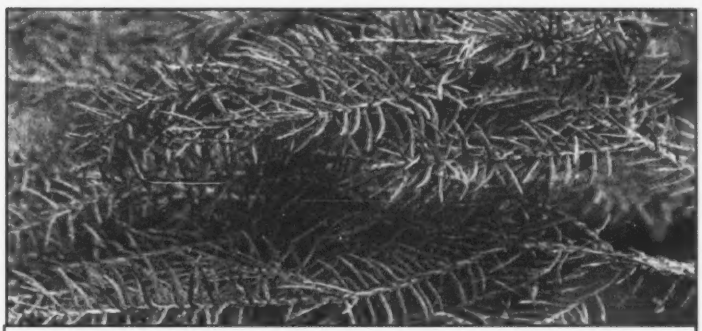

Figure 2: Spruce spider mite injury.
Source: Saskatchewan Agriculture

Insects can cause a lot of damage and often compound environmental damage. The most common insect problem this year is the Spruce spider mite (*Oligonychus ununguis)*, as trees under stress are especially susceptible to them. Spider mite feeding can cause premature loss of needles, leading to twig and branch death. Heavy infestations can kill trees, especially during drought periods. Mites produce abundant silk (webbing) that collects dust and dead needles, causing a grey appearance (Figure 2). Examination with a hand lens will reveal webbing and shed mite skins.

Figure 3: Pine needle scale on spruce.
Source: Saskatchewan Agriculture

Feeding begins in mid-May and continues throughout the growing season. Damage is usually first noticed on the lower inside branches, but spreads upward and outward as the infestation progresses.

A heavy rain accompanied by high winds can provide natural population control. Also, some control can be achieved by washing infested trees with a strong jet of water. Miticides are preferred over general insecticides. Products should be applied at high pressure so the spray penetrates to the inner branches and webbing. Always read the directions on the label and scout regularly, since mite populations can increase rapidly.

Pine needle scale (*Chionaspis pinifoliae)* has increased in numbers and severity in 2009, and can cause needle discolouration and desiccation (Figure 3).

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Causes of Damage and Death of Spruce Trees in Shelterbelts
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Colley spruce gall adelgid (*Adelgid Adelges cooleyi* - Gillette) is closely related to aphids. In Saskatchewan and Manitoba, where there is no native Douglas fir, the adelgid can complete its life cycle entirely on spruce. Early-stage nymph feeding causes the formation of galls, whereas later stages feed only on needles.

Yellow-headed spruce sawfly (*Pikonema alaskensis)* larvae feed on the new needles, leaving short brown stubs. Once the new growth is devoured, the larvae feed on the older needles. By July, infested trees appear ragged and yellowish-brown, especially near the top. Heavily infested trees may be completely stripped of foliage. Three to four consecutive years of moderate-to-heavy attacks can kill the tree. The yellow-headed spruce sawfly prefers young trees grown in open areas, making Prairie shelterbelts an ideal target.

Spruce budworms *(Choristoneura occidentalis)* attack the crowns of the trees, leading to reddish-brown discolouration. During severe infestations, the budworm can strip away all new foliage along with some old needles. Repeated severe infestations can kill the tops of trees in three years and whole trees in five years.

White pine weevils (*Pissodes strobe)* attack the terminal bud of spruce trees, leading to a shape like a shepherd's crook. By mid-summer, the previous season's leader is distorted and wilted. It gradually changes colour from yellow to red to brown. By late summer to fall, large holes made by emerging adults can be seen midway down the previous year's leader. Similar leader damage symptoms can be caused by frost, high winds or birds.

Other insects can infest dead or dying spruce trees. Spruce bark borers speed the decaying process of dead trees. The borers are a major economic pest to the lumber industry, although they have limited impact on healthy trees in a shelterbelt. The larval stage of the whitespotted sawyer (*Monochamus scutellatus* - Say) causes the most damage of all the borers, by feeding inside the trunks of weak or dead trees.

Needle cast is the most common fungal disease of spruce trees. Because the infection can occur up to a year and a half prior to the appearance of symptoms, diagnosis of the disease can be a challenge. ✡

For information about submitting samples to Saskatchewan Agriculture's Crop Protection Lab, go to www.agriculture.gov.sk.ca/ (Programs & Services > Crop Protection Lab Services); Or phone (306) 787-8130.

Crop Residue Management for Zero-Till

By Ken Panchuk, Provincial Specialist, Soils

Chopping and uniformly spreading straw and chaff is a critical first step in any zero-till or minimum-till seeding system. Proper straw management at harvest makes seeding the next crop easier and also improves soil moisture conservation.

Figure 4: Canola seedlings beneath tall cereal stubble.
Source: Agriculture and Agri-Food Canada

Further improvement in moisture conservation and moisture-use efficiency can be made by adopting tall-stubble technology. This is especially effective in the Brown and Dark Brown soil zones where moisture is often limiting. Leaving the stubble tall and uniformly chopping and spreading the crop residue, followed by seeding directly into the tall stubble optimizes the moisture-use efficiency. Some producers are experimenting with stripper-headers to maximize stubble height. Also, between-the-rows seeding technology allows zero-tillers to keep as much stubble as possible standing after seeding.

Figure 5: Redekop fine-cut straw chopper.
Source: Redekop Manufacturing

Fine-cut straw choppers are now the standard in the industry, allowing chopped straw and chaff to be spread uniformly over the width of the cut. These high-performance choppers also require periodic maintenance to effectively handle a wide variety of crop types under variable harvest conditions. Keeping the flails and knives in good condition assures that the straw chopper will do the job effectively and efficiently. This is particularly important for hard-to-chop crop residues like flax.

Upgrading to the self-sharpening option will greatly extend the life of the straw chopper's cutting parts and reduce down time during the harvest rush.

Some producers in the more moist areas of Saskatchewan are experimenting with a newer straw management system that uses a straight-cutting header or stripper-header that leaves the stubble tall.

Figure 6: Rotary mowing cereal stubble.
Source: Schulte Industries

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Crop Residue Management for Zero-Till
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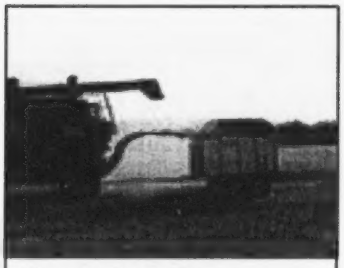

Figure 7: Chaff collector.
Source: Redekop Manufacturing

Then, sometime between harvest and seeding, a specially designed rotary mower is used to chop and spread the stubble to allow for seeding. This system allows flexibility in the timing of the residue management. It can take place in the fall, if soil moisture recharge is adequate, or in the spring, to allow the tall stubble to collect snow for extra moisture recharge.

Another option for handling surplus cereal straw this fall is to make arrangements with a cattle producer to bale the excess straw and/or collect chaff. Hay yields were generally low this year, making surplus straw and chaff a viable cattle feed option. ☼

Preparing for Winter Cereals

By Ken Panchuk, Provincial Specialist, Soils

Producers will be planting winter cereals during the last week of August and the first two weeks of September. The hallmark of establishing a winter cereal crop is to seed shallow into standing stubble whether there is good seedbed moisture or not. Producers are encouraged to apply phosphate fertilizer with, or near, the seed of winter cereals to provide the starter nutrients, nitrogen and phosphorus. Phosphorus is needed to grow healthy seedlings prior to freeze-up to optimize the winter hardiness of the winter cereal crop. Winter wheat growers should not choose wheat stubble fields or stubble adjacent to green wheat crops to minimize the spread of wheat streak mosaic virus.

Winter cereals need about 20 lb. of nitrogen per acre for fall growth, so some nitrogen can be banded in the seed row with the phosphate fertilizer to meet this need. Be careful not to exceed the safe rates of urea-nitrogen placed with the seed if seedbed moisture is good. If seedbed moisture is poor, reduce the rate of seed-placed nitrogen by at least 50 per cent. Generally, seeding winter cereals takes place under drier seedbed conditions, so it is wise to add only a small amount of nitrogen with the seed.

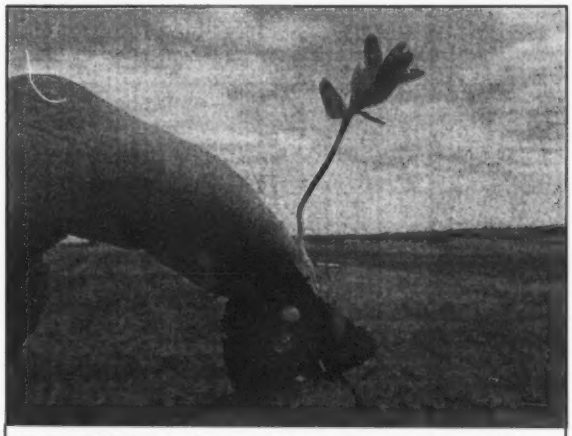

Figure 8: Polycoated urea granules in a flax crop June 2009.
Source: Agrium Inc.

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Preparing for Winter Cereals
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Higher rates of seed-placed nitrogen increases the risk of the salt-effect, which delays germination, reduces the emergence rate and increases the risk of winter injury. If higher rates of nitrogen are to be applied, consider mid-row banding or side-banding to keep the nitrogen away from the seed row. Urease inhibitor and polycoated urea are also available to reduce the risk of injury with urea-nitrogen placed in the seed row.

Polycoated urea offers the option of applying most of the nitrogen for winter cereal production during the seeding operation. Follow product instructions when applying polycoated urea to not exceed the safe amount that can be applied in the seed row. Polycoated urea can also be applied in a side-band or mid-row band position. Polycoated urea keeps the nitrogen in urea form longer, minimizing the amount of urea that converts to the nitrate form before winter freeze-up. Nitrogen has the highest risk to loss in the nitrate form and the biggest losses occur under wet soil conditions during the spring thaw when nitrate-nitrogen converts easily to nitrous oxide and/or gaseous N_2.

Nitrogen can be applied in the early spring after a winter survival assessment is completed. If a good winter cereal stand establishes in the spring, apply the required rate of nitrogen for the desired target yield, based on subsoil moisture and expected growing season precipitation. There are several technologies for banding nitrogen in the spring, such as in-crop coulter-banding.

Remember, the main focus should be on seeding and establishing a good winter cereal stand and retaining as much stubble as possible to trap snow for insulation and moisture conservation. ✿

Winter Wheat Planting

By Blaine Recksiedler, Provincial Specialist, Cereal Crops

Winter wheat is becoming increasingly popular on the Canadian Prairies. Approximately 490,000 ha were seeded in the fall of 2008. This represents a five-fold increase in the last 10 years.

Successful producers report numerous benefits to growing winter wheat compared to spring wheat, including: improved weed control, increased economic returns due to higher yields, lower pesticide costs and more efficient use of spring soil moisture and precipitation.

Figure 9: Winter wheat seedlings.
Source: Ducks Unlimited Canada

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Winter Wheat Planting

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Planting in the fall also makes better use of equipment and distributes the workload more evenly, and conserves wildlife habitat. The earlier maturity of a winter crop also reduces the risks posed by fusarium head blight and wheat midge.

Improvements in variety characteristics and marketing opportunities (i.e. food, feed and ethanol markets), as well as improved agronomic practices, have led to more producers trying winter wheat. Seven new winter wheat varieties were recommended for registration in the past two years. For a list of varieties that are recommended for production in Saskatchewan, along with corresponding yield and agronomic information, visit the *Varieties of Grain Crops 2009* publication on the Saskatchewan Agriculture website. The two most popular winter wheat varieties grown in Saskatchewan in 2008 were CDC Buteo (58 per cent of seeded area) and CDC Raptor (10 per cent of seeded area).

The following are some successful planting strategies for winter wheat production.

Planning

- Select a variety that offers the agronomic package and marketing opportunities best suited to your situation.
- Seed into suitable stubble in late August to early September. To reduce the risk of wheat streak mosaic virus, winter wheat should not be sown before nearby spring wheat or barley crops have matured. A seven- to 10-day delay is recommended to avoid the 'green bridge' that allows transmission of the virus between host plants.
- Manage the previous crop's stubble to trap snow to insulate the over-wintering crown tissue. Cut the spring crop as high as possible and spread the straw thoroughly.
- Winter wheat seeding usually occurs during breaks in harvest, so seed and fertilizer should be sourced well before then.

Seeding

- Equipment – Crown tissue over-winters most successfully in a zero-tillage production system. Equipment should be capable of shallow seeding at a constant depth, and with minimal stubble disturbance.
- Seeding date – Development of healthy vigorous plants before freeze-up will improve the rate of winter survival. Three or four true leaves, plus early first tiller stage is ideal. The best window for seeding in Saskatchewan is August 25 to September 10. Seeding too early results in excessive growth in the fall, loss of winter hardiness and increased risk of winter injury. Seeding too late can result in poorly established plants with less winter survival potential.
- Seeding depth – Preferably, winter wheat should be seeded at a depth of less than 2.5 cm into a firm, moist seedbed. Seeding deeper can result in delayed emergence, spindly plants and winter injury. Shallow-seeded crops will also benefit from small amounts of rain.

For more information, see the article on Preparing for Winter Cereals in this edition of the Crop Production News. ☼

Disease Issues With Cereal Heads

By Faye Dokken, Provincial Specialist, Plant Diseases

A combination of cool, damp weather and uneven flowering over the last two seasons may set the stage for a number of cereal head diseases issues this harvest. No matter the destination after harvest, seed quality will play an important role in determining cereal crop value and end-use. Marketplace seed quality is characterized by grading factors that are designated by the Canadian Grain Commission, and is normally assessed at the elevator. Quality of seed destined for planting will be characterized by a different set of factors. Seed testing laboratories can help you determine germination and vigour, and can detect certain diseases. Seed testing is usually done in the fall or spring (sometimes both), depending on the producer's preference and reasons for having the seed tested. Some seed abnormalities and discolourations can be caused by pathogens or saprophytes (organisms which feed on dead or dying tissue), while others are simply a result of environmental factors. The following are a few examples of common cereal head disease issues that may be noticed this harvest.

Figure 10: Loose smut on durum.
Source: Cereal and Flax Pathology, Crop Development Centre, U of S

Smuts and Bunts

Loose smut was reported in several areas of the province during cereal flowering this summer. Loose smut is caused by different species of *Ustilago,* depending on the host (barley, oat or wheat). Infection occurs during flowering but does not affect the seed's appearance or quality at harvest. Rather, the *Ustilago* mycelium remains dormant in the seed until it is planted, when it attacks the growing point of the seedling. The disease is not revealed until a mass of dark brown spores appears in place of a normal head (Figure 10). This means that the symptoms we have seen this summer are a result of seed that was infected previously. By harvest, spores will likely be blown or washed away, leaving a bare rachis. Remember that spore dispersal continues the disease cycle, and where loose smut was observed this summer, spores may have spread to healthy heads, infecting the developing seed once again. *Ustilago* is detected by seed testing laboratories, and systemic seed treatments are effective at controlling it.

Covered and false loose smuts of barley, oats and related grasses are also caused by *Ustilago* species, whereas common bunt or stinking smut is caused by *Tilletia laevis* and *T. tritici*. Seed testing labs do not test for these diseases. Bunt affects wheat, rye, triticale and other grasses, and results in the replacement of developing kernels with spore-filled bunt balls. These spores are a source of infection in contaminated seed, but may be controlled with a seed treatment. Varieties resistant to all forms of smut are available.

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Disease Issues with Cereal Heads

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Fusarium

Species of *Fusarium* can cause damage and discolouration to grain through disease infection or saprophytic growth. Sporodochia (cushion-like fruiting bodies) associated with fusarium head blight (FHB) on cereals appear as an intense red or orange discolouration that can be removed by scraping or rubbing the affected seed. In barley, FHB causes a darker discolouration of spikelets and kernels. In wheat and rye, FHB results in the production of tombstone or scabby kernels (Figure 11), which may result in grade reductions. If heads were infected by *F. graminearum* or *F. culmorum,* seeds may also be contaminated with vomitoxins, making grain undesirable for certain end-uses.

Figure 11: Fusarium head blight tombstone kernels.
Source: Saskatchewan Agriculture

Grain can be tested for vomitoxin levels to determine suitability for particular food, feed or malting purposes. Seed should be tested for germination and presence of *Fusarium* before re-planting, and use of a registered seed treatment may improve emergence and reduce seedling blight.

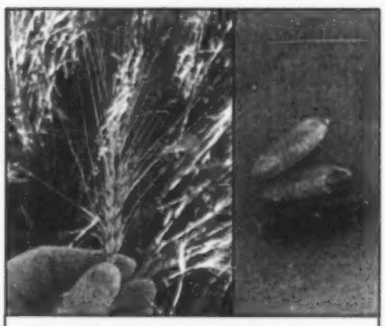

Figure 12: Ergot in 2008 durum harvest.
Source: Saskatchewan Agriculture

Ergot

Record-breaking ergot levels appeared in many areas of the province last year, meaning that there will be an elevated risk of an outbreak for a couple of years to come, especially if the conditions prove favourable again. *Claviceps purpurea* causes ergot on most cereals and grasses in Canada, and is a particularly important disease of rye. Infected heads can be identified by one or several dark purplish sclerotia protruding from the spike in place of normal kernels (Figure 12).

Watch out for ergot this harvest, especially in cereal crops that were planted from 2008 seed, as well as in fields planted on or near 2008 cereal crop stubble, as there will likely be an increased load of ergot bodies in the soil. If ergot shows up in particular areas of the field, such as the headlands, consider harvesting these separately. Sclerotia are visible in grain and can usually be removed through commercial cleaning.

Seed testing labs do not test for ergot, however, and downgrading may occur at the elevator (thresholds for No. 1 wheat or barley is one ergot body per kg of seed). Toxic levels to livestock are 0.1 per cent ergot material or 10 ergot bodies per litre or one ergot body per 1,000 kernels.

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Disease Issues with Cereal Heads
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Other Types of Discolouration

There are several different fungi that can discolour cereal grains, which often occur as a result of disease, delayed harvest or improper storage. Seed testing labs do not routinely test for these diseases.

Sooty moulds appear as a speckled grey, black or dark green growth on the surface of the heads (Figure 13). They are most likely to develop when rain has fallen in the final stages of crop maturation, or when harvest is delayed into the fall when humidity levels are higher. Sooty mould is not considered a true crop disease, as the fungi that cause it cannot infect healthy tissue. Instead, sooty moulds are the result of secondary, saprophytic fungi that colonize dead or dying plant tissues under moist conditions (e.g. *Alternaria, Cladosporium, Stemphylium,* and *Epicoccom* species).

Figure 13: Sooty mould.
Source: Saskatchewan Agriculture

An example of a common cereal seed discolouration is black point (smudge), usually caused by *Alternaria alternata, Cochliobolus sativus* or *Pyrenophora tritici-repentis,* the latter of which also causes red smudge on wheat kernels and tan spot on wheat leaves. Saprophytic fungi such as *Aspergillus* and *Penicillium* can cause dark discolourations and other seed quality issues during storage. In general, spoilage can be prevented by keeping grain dry and cool during storage, and aerating the bin to equalize grain temperature and reduce moisture migration.

For more information on cereal head and seed-borne disease issues, see the Saskatchewan Ministry of Agriculture publications Ergot of Cereals and Grasses, Fusarium Head Blight, Sooty Moulds of Cereals at Harvest, Black Point and Smudge of Wheat, and Guidelines for Seed-Borne Diseases of Cereal Crops. ✿

The ***Crop Production News*** is a publication of the
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